

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
17 January 2002 (17.01.2002)

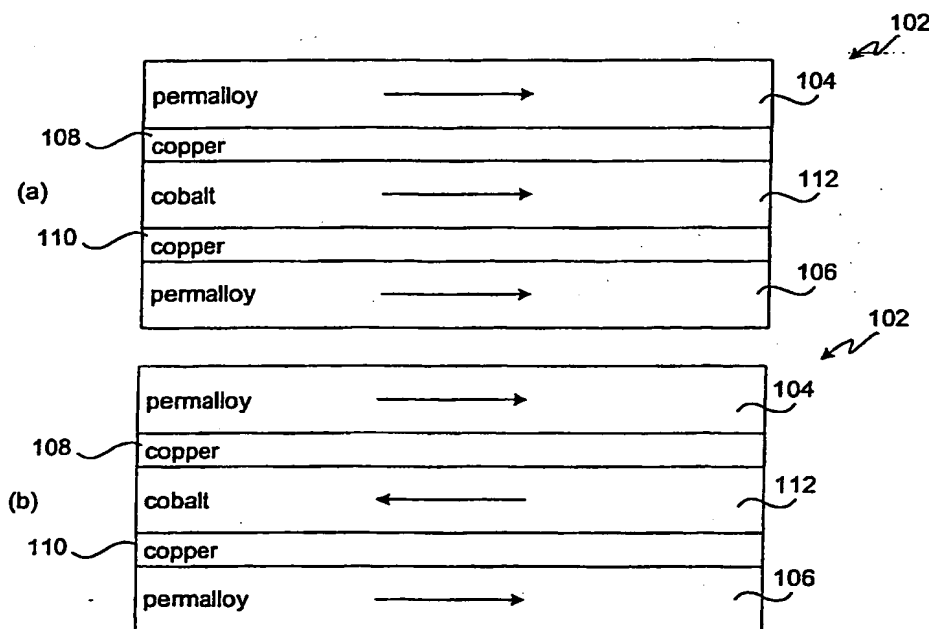
PCT

(10) International Publication Number
WO 02/05470 A3

- (51) International Patent Classification⁷: **G11C 11/15**,
G11B 5/39, 5/127
- (74) Agent: **VILLENEUVE, Joseph, M.**; BEYER WEAVER
& THOMAS, P.O. Box 778, Berkeley, CA 94704-0778
(US).
- (21) International Application Number: **PCT/US01/20665**
- (22) International Filing Date: **27 June 2001 (27.06.2001)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
60/217,337 11 July 2000 (11.07.2000) US
09/883,645 18 June 2001 (18.06.2001) US
- (71) Applicant: **INTEGRATED MAGNETOELECTRON-
ICS CORPORATION [US/US]**; 1214 Oxford Street,
Berkeley, CA 94709 (US).
- (72) Inventors: **SPITZER, Richard**; 1214 Oxford Street,
Berkeley, CA 94709 (US). **TOROK, E., James**; 860
County Road IW, Shoreview, MN 55126 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,
DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF,
CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report

[Continued on next page]

(54) Title: **MAGNETORESISTIVE TRIMMING OF GMR CIRCUITS**



(57) Abstract: Methods and apparatus are described relating to an electronic device which includes at least one configurable resistive element (104, 106, 112). Each such configurable resistive element includes at least one multi-layer thin film (104, 106) element exhibiting giant magnetoresistance. The resistance value of each of configurable resistive element (104, 106) is configurable over a resistance value range by application of at least one magnetic field which manipulates at least one magnetization vector associated with the thin film element (104, 106).

WO 02/05470 A3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/20665**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :G11C 11/15; G11B 5/39, 5/127

US CL :365/158, 173; 360/324.12, 325

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 365/158, 173; 360/324.12, 325

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONEElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
USPTO APS EAST**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,587,943 A (TOROK et al) 24 December 1996 (24.12.1996), see entire document.	1-19
X,E	US 6,278,594 B1 (ENGEL et al) 21 August 2001 (21.08.2001), see entire document.	1-19
X,E	US 6,292,336 B1 (HORN et al) 18 September 2001 (18.09.2001), see entire document.	1-19

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

24 JANUARY 2002

Date of mailing of the international search report

08 FEB 2002

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

SON THANH DINH

Telephone No. (703) 308-4120